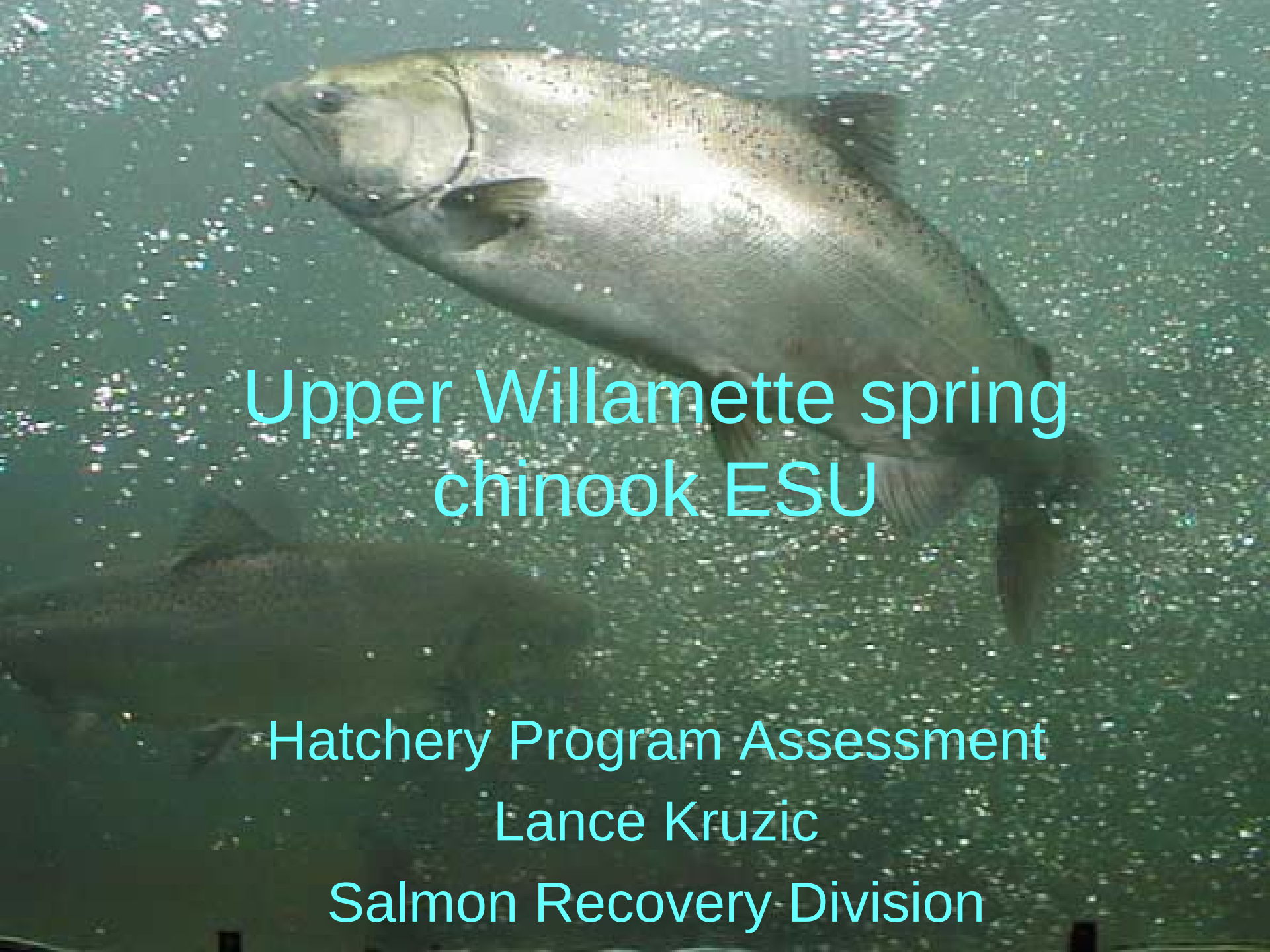


Upper Willamette spring chinook ESU

Hatchery Program Assessment

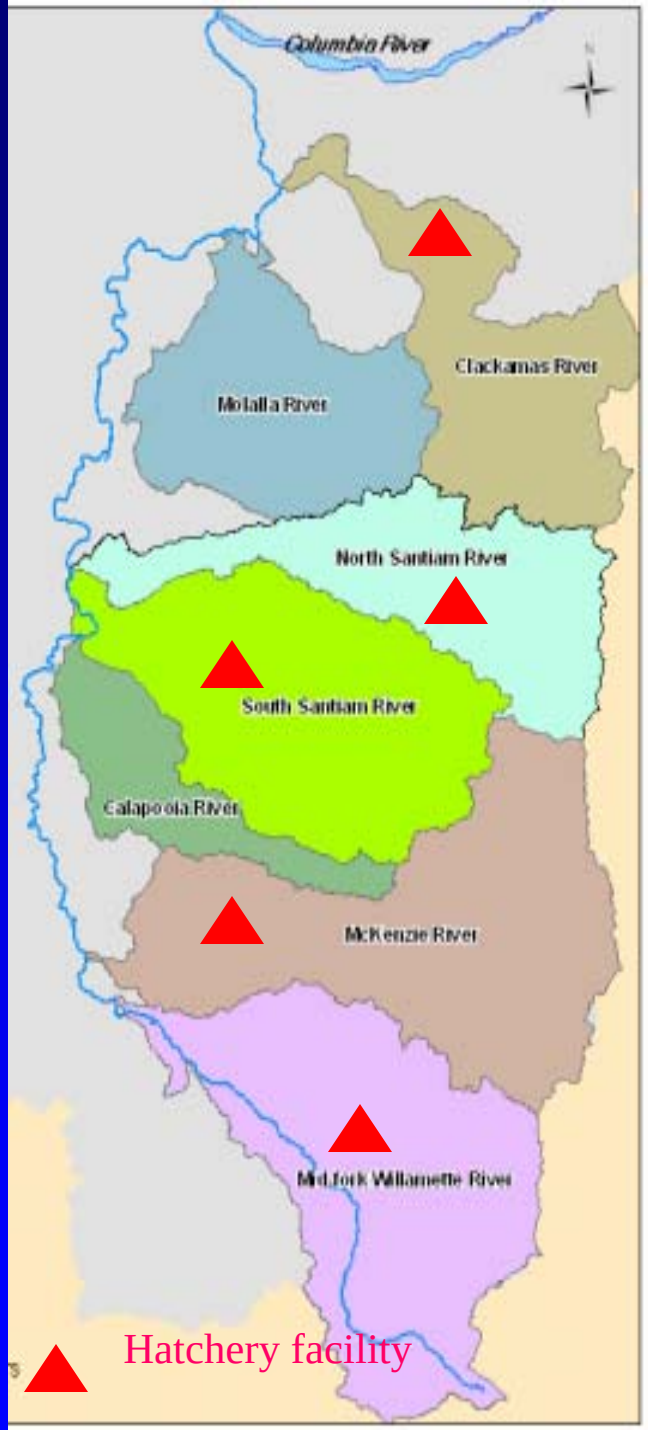
Lance Kruzic

Salmon Recovery Division

Upper Willamette Chinook

- *All* natural and hatchery spring chinook are included in the ESU.
  - Clackamas
  - Molalla
  - N. Santiam
  - S. Santiam
  - Calapooia
  - McKenzie
  - Middle Fork
- Not included in the ESU- fall chinook above the Willamette Falls

All mixed populations (some natural fish and hatchery fish)

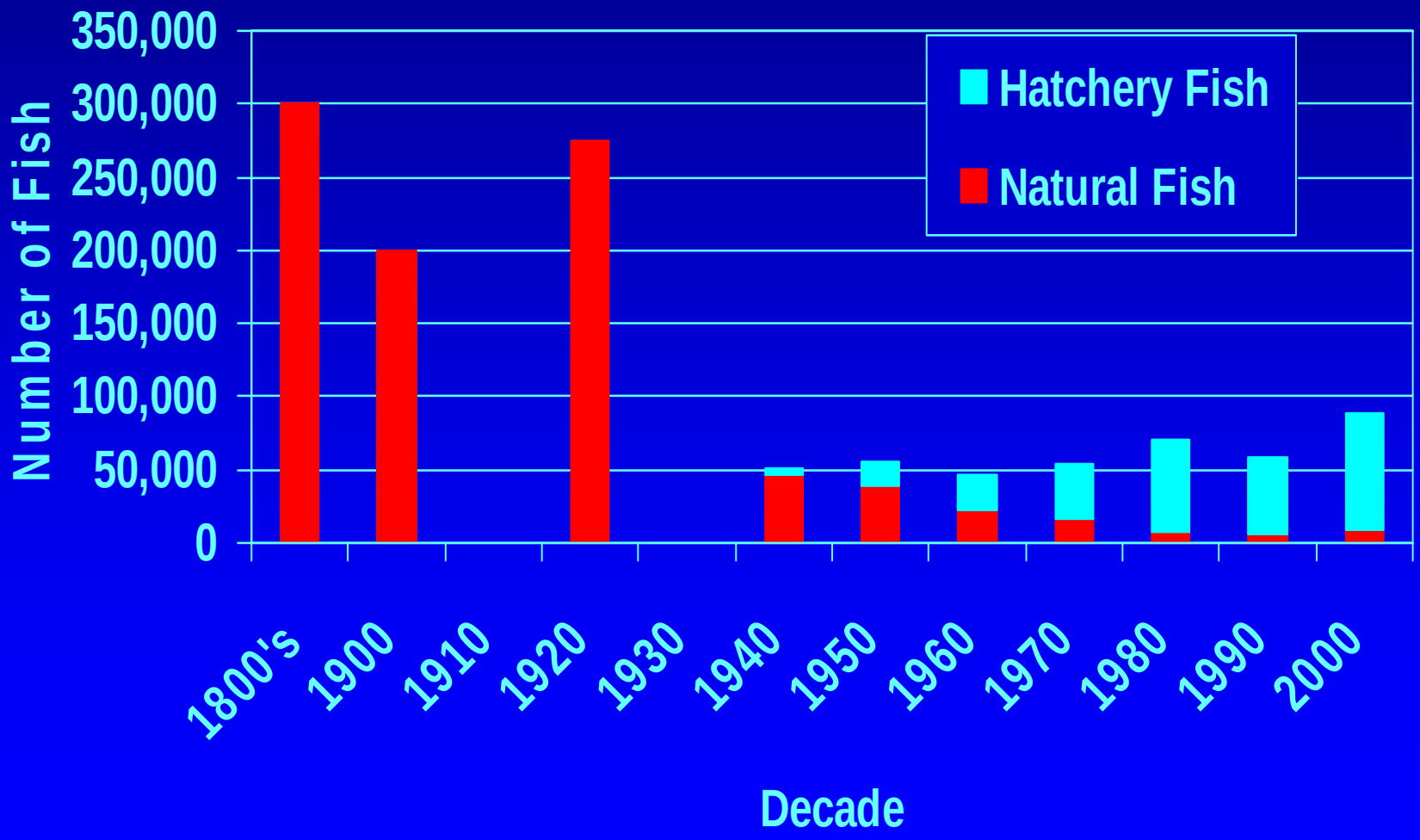


Summary of Hatchery Programs
(all included ESU)

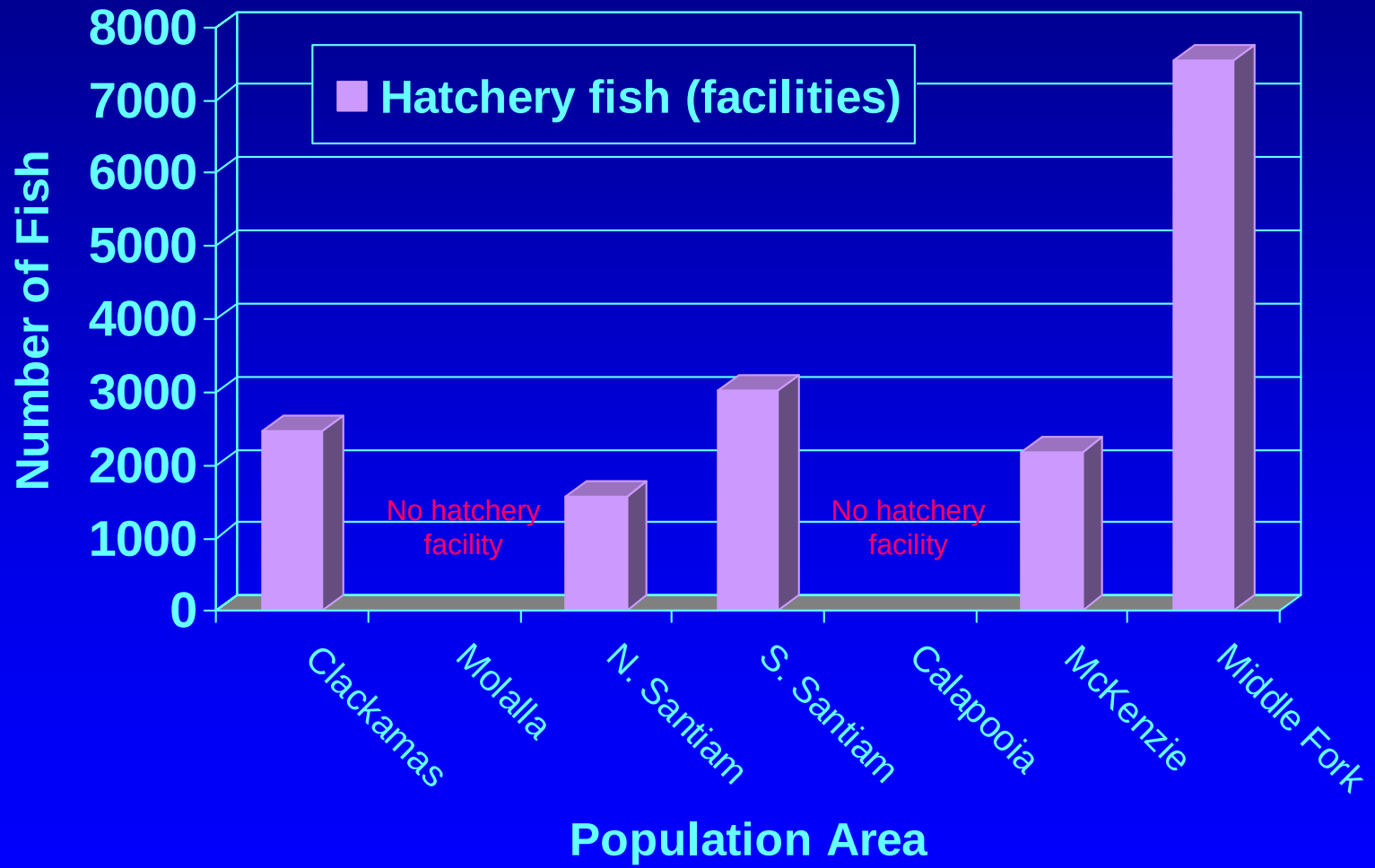
Population area (hatchery stock)	Isolated or integrated	Program type	Purpose	Production goal	In operation since
Clackamas (Clackamas)	Integrated	Smolt	Mitigation	1.3 million	1979
Molalla (S. Santiam)	Integrated	Smolt	Mitigation	100,000	1990
N. Santiam (N. Santiam)	Integrated	Smolt	Mitigation	667,000	1950
S. Santiam (S. Santiam)	Integrated	Smolt	Mitigation	1.1 million	1968
Calapooia (S. Santiam)	Integrated	Adult		Varies by year	1990
McKenzie (McKenzie)	Integrated	Smolt	Mitigation	985,000	1930
Middle Fork (Middle Fork)	Integrated	Smolt	Mitigation	1.4 million	1957

ESU SUMMARY: 7 TRT populations (all have hatchery programs), 5 hatchery stocks (all included in the ESU), 5.5 million annual smolt production goal

Average return of spring chinook to the Willamette River

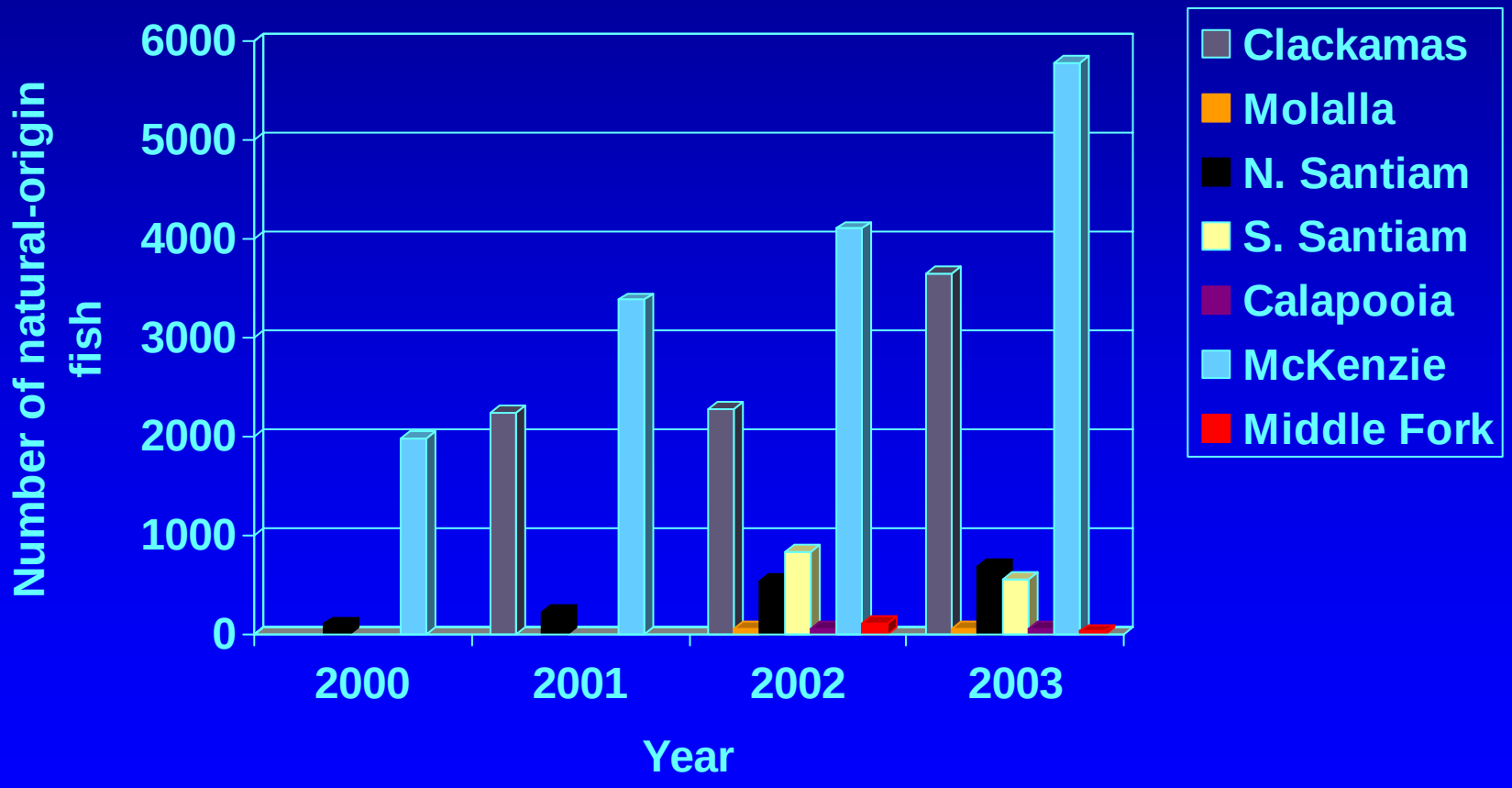


Mean Return of Spring Chinook to the Hatcheries, 1969-2003

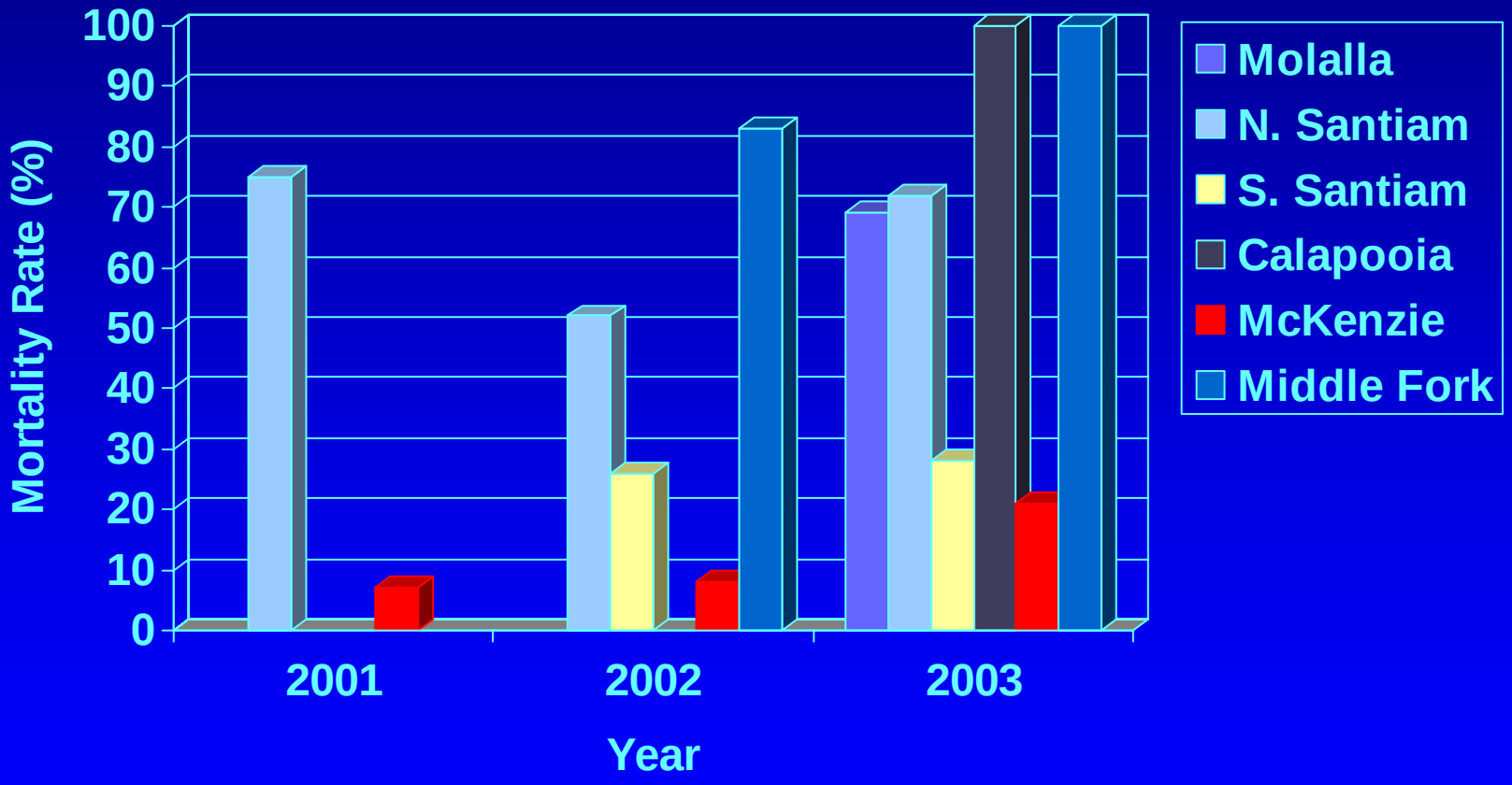


All hatchery programs have consistently returned enough fish for broodstock needs (post harvest).

Number of natural-origin spring chinook returning to each population area



Prespawning mortality rates of spring chinook



Percent of female carcasses recovered that were unspawned.

“The effects of hatchery fish on the likelihood of extinction of an ESU, depend on how hatchery fish affect four key attributes”

Viable Salmon Populations

Abundance

Productivity

Spatial Structure

Diversity

Effect on Abundance

- Benefit from hatchery fish on total abundance.
- Benefit from hatchery fish being outplanted as live adults above the impassable dams. Producing some smolts.
- Stable returns of hatchery fish to all hatchery facilities.

Effect on Productivity

- High prespawn mortality rates of *hatchery* and *natural* fish on the spawning grounds is greatly limiting number of spawners.
- No information suggests hatchery programs are increasing productivity rates (R/S) of the natural spawners. (Benefits from reintroductions are included in spatial structure and abundance)
- Replacement rates of fish to the hatcheries (spawner-spawner) have averaged greater than one.
- Hatchery fish are providing carcass nutrients back to historic habitats above the dams.

Effect on Spatial Structure

- Hatchery fish being used the last few years to reintroduce spring chinook back into historic habitats above the dams (S. Santiam, N. Santiam, Middle Fork, McKenzie above Cougar).
- Adults outplanted into Calapooia River, where few, if any, spring chinook return naturally.
- Substantial reintroductions of spring chinook back into historic habitat that will likely benefit the ESU.

Effect on Diversity

- Potential negative effects from high numbers of hatchery fish spawning naturally in the Clackamas and McKenzie (areas with most remaining habitat and demonstrated NORs).
- Hatchery fish have some different life history characteristics than natural fish (e.g. smolt releases, age at return&timing).
- Potential positive effects in the areas where dams have blocked access and the local hatchery stocks only remaining remnants of historic run. Hatcheries likely incorporated natural run into the broodstock over the years. Information in recent years shows some differences among hatchery stocks in the ESU.

Effect of Artificial Propagation on VSP Attributes Upper Willamette Chinook Salmon

Viability Criteria	BRT VSP Risk Score	Decreases Risk	Neutral or Uncertain	Increases Risk
Abundance	3.7	X		
Productivity	3.1		X	
Spatial Structure	3.6	**X**		
Diversity	3.2		X	

Recommendation: No Change (threatened)